

Message Text

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TO AMEMBASSY LONDON

AMEMBASSY MBABANE

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SUBJECT:SEISMIC RESEARCH OBSERVATORIES PROGRAM

1. DEFENSE ADVANCED RESEARCH PROJECTS AGENCY (ARPA), AS PART OF CONTINUING SEISMIC VERIFICATION RESEARCH EFFORT, PLANS TO CONDUCT THROUGH THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA) A SEISMIC RESEARCH OBSERVATORY (SRO) PROGRAM. SRO PROGRAM IS DESIGNED TO PROVIDE AN IMPROVED WORLDWIDE DATA BASE FOR FUTURE RESEARCH ON IDENTIFICATION OF SEISMIC EVENTS. THE OBJECTIVES ARE TO LOWER THE BODY WAVE AND SURFACE WAVE DETECTION THRESHOLD OF THE PRESENT WORLDWIDE NETWORK OF STANDARD SEISMOGRAPH (WWNSS) STATIONS WHICH WERE ESTABLISHED UNDER AN ARPA-UNCLASSIFIED

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SPONSORED PROGRAM AND HAVE BEEN IN OPERATION SINCE 1962. THESE UPGRADED SEISMOLOGICAL STATIONS WILL INCLUDE IMPROVED SYSTEMS FOR RECORDING SHORT-PERIOD AND LONG-PERIOD SEISMIC WAVES AND WILL SUPPLEMENT DATA NOW AVAILABLE FROM THE WWNSS

STATIONS AS WELL AS FROM NATIONAL NETWORKS AND EXPERIMENTAL STATIONS LOCATED IN MANY COUNTRIES.

2. TECHNICAL PLAN -- ALTHOUGH A WWNSS STATION DOES NOT EXIST IN SWAZILAND, WE BELIEVE THAT AN SRO STATION IN THAT PART OF THE WORLD WOULD CONTRIBUTE SIGNIFICANTLY TO THE OBJECTIVES OF THE ARPA SEISMIC VERIFICATION RESEARCH PROGRAM. SINCE THE U.K. HAS A GEOPHYSICAL STATION IN SWAZILAND, A JOINT EFFORT BETWEEN THE U.S. AND U.K. IN THE

INSTALLATION AND OPERATION OF AN SRO IN THAT COUNTRY WOULD SEEM APPROPRIATE. THERE IS REASON TO BELIEVE THAT A PROPOSAL WOULD BE FAVORABLY RECEIVED BY THE U.K. AUTHORITIES. THE RESPONSIBLE OFFICIAL IN THE U.K. MINISTRY OF DEFENCE IS DR. FRANK PANTON, ASSISTANT CHIEF SCIENTIFIC ADVISOR. BRIEFLY, IT WOULD BE PROPOSED THAT THE U.S. WOULD PROVIDE AND INSTALL THE EQUIPMENT WHEREAS THE U.K. WOULD MAKE THE FORMAL ARRANGEMENTS WITH THE SWAZILAND GOVERNMENT, PREPARE THE SITE (DRILL THE BOREHOLE AND PROVIDE A SMALL EQUIPMENT SHELTER) AND OPERATE THE STATION FOR THE U.S. SPARE PARTS AND SUPPLIES WOULD BE PROVIDED BY THE U.S. FINANCIAL RESPONSIBILITY FOR SITE PREPARATION AND SRO OPERATION WILL BE SUBJECT TO DISCUSSION BETWEEN NOAA AND U.K. OFFICIALS ONCE U.K. AGREEMENT IN PRINCIPLE IS OBTAINED. THE BOREHOLE MUST BE DRILLED, CASED, CEMENTED FROM BOTTOM TO TOP, AND DRY. THE HOLE MUST NOT EXCEED 3 DEGREES OF DRIFT. THE BOREHOLE SHOULD BE DRILLED INTO COMPETENT ROCK, GRANITE IF POSSIBLE, AND BE APPROXIMATELY 200 METERS DEEP. EXACT LOCATION OF THE HOLE WOULD BE AGREED UPON BY THE U.K. REPRESENTATIVE IN SWAZILAND IN CONSULTATION WITH THE NOAA REPRESENTATIVE WHO WOULD VISIT THE SITE WHEN CONVENIENT TO THE U.K. AUTHORITIES. A ROOM OR SMALL BUILDING WOULD BE REQUIRED WITH SUFFICIENT SPACE TO CONTAIN TWO EQUIPMENT RACKS, DIGITAL TAPE RECORDER, POWER SUPPLY, ENVIRONMENTAL CONTROL EQUIPMENT, A WORK BENCH AND A SMALL STORAGE AREA FOR TOOLS

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AND SPARE PARTS. THE DATA TO BE OBTAINED FROM THIS AND ALL SRO STATIONS WILL BE UNCLASSIFIED AND WILL BE AVAILABLE TO ALL SEISMOLOGISTS, INCLUDING SWAZI SCIENTISTS.

3. ADDITIONAL INFORMATION ON SEISMIC RESEARCH OBSERVATORIES (SRO) PROGRAM:

THE SRO PROGRAM IS PART OF THE OVERALL ARPA PROGRAM OF SEISMIC VERIFICATION RESEARCH DESIGNED TO IDENTIFY AND RESOLVE THE REMAINING PROBLEMS IN IDENTIFYING SEISMIC EVENTS IN SUPPORT OF THE OBJECTIVE OF AN ADEQUATELY VERIFIED COMPREHENSIVE NUCLEAR TEST BAN TREATY.

UNDERGROUND DISTURBANCES CREATE BOTH BODY AND SURFACE

WAVES. BODY WAVES OF RELEVANCE ARE COMPRESSIONAL WAVES WHICH SPREAD OUT FROM THE DISTURBANCE IN THE SAME WAY THAT SOUND SPREADS FROM A SOURCE IN THE ATMOSPHERE. BODY WAVES PROPAGATE THROUGH THE INTERIOR OF THE EARTH. SURFACE WAVES TRAVEL ALONG THE SURFACE OF THE EARTH IN MUCH THE SAME MANNER AS WAVES CAUSED BY A STONE THROWN INTO A POND.

IN ADDITION TO WAVES CREATED BY SPECIFIC DISTURBANCES UNDERGROUND, THERE IS A CERTAIN AMOUNT OF BACKGROUND SEISMIC "NOISE" WHICH IS CONSTANTLY PRESENT AT THE EARTH'S SURFACE. NEAR POPULATED AREAS, BACKGROUND SEISMIC NOISE IS PRODUCED LARGELY BY TRAFFIC AND INDUSTRY. THE SEISMIC NOISE LIMITING CAPABILITIES OF STATIONS REMOTE FROM POPULATED AREAS IS PRODUCED BY COUPLING OF ATMOSPHERIC ENERGY INTO THE GROUND BY VARIOUS MECHANISMS. PROPER SITING OF THE NEW DATA AND DATA FORMAT RESULTING FROM THE SRO PROGRAM WILL ALLOW EXTENSIVE TESTING OF VARIOUS SOPHISTICATED IDENTIFICATION CRITERIA NOT EASILY EVALUATED WITH PRESENTLY AVAILABLE DATA. THE SRO PROGRAM WILL USE NEW BROAD BAND SEISMOMETERS IN RELATIVELY DEEP (200 METERS) BOREHOLES TO MINIMIZE THE EFFECTS OF SURFACE-INDUCED SEISMIC "NOISE."

A PARTICULARLY VEXING PROBLEM IS THAT SOME EARTHQUAKES ARE CLASSIFIED AS POSSIBLE EXPLOSIONS WHEN USING PRESENTLY UNCLASSIFIED

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AVAILABLE DATA AND PRESENTLY EMPLOYED IDENTIFICATION CRITERIA. UPGRADING OF THE WWNSS STATIONS WILL ALLOW EXTENSIVE TESTING OF POSSIBLE EXPLANATIONS FOR THIS SITUATION AND SUGGESTED REMEDIES FOR IT. AN AREA WHERE SUCH EVENTS ARE KNOWN TO OCCUR IS NORTHERN INDIA AND TIBET. THE DISTRIBUTION OF THE SRO'S WAS SPECIALLY CHOSEN TO PROVIDE CONCENTRATED COVERAGE OF THE TIBETAN AREA. THE DATA OBTAINED WILL ALSO CONTRIBUTE TO UNDERSTANDING THE EARTHQUAKE MECHANISM AND THE DETERMINATION OF THE DEPTH OF SEISMIC EVENTS.

AN ADDITIONAL FEATURE OF THE SRO INSTRUMENTATION WILL BE ITS ABILITY TO RECORD DATA OVER A WIDE AMPLITUDE RANGE. BECAUSE OF GREATER EASE OF HANDLING AND ANALYSIS OF DIGITAL DATA (IN CONTRAST TO ANALOG DATA), RELATIVELY SOPHISTICATED EQUIPMENT OF A DIGITAL RECORDING NATURE WOULD BE EMPLOYED. THIS EQUIPMENT SENSES WHETHER A SMALL OR LARGE EVENT IS ARRIVING AND AUTOMATICALLY SETS ITSELF TO RECORD THE EVENT WITHIN THE PROPER RANGE OF THE RECORDING SYSTEM.

THE SRO'S WILL BE LOCATED AS MUCH AS POSSIBLE AT EXISTING WORLDWIDE NETWORK OF STANDARD SEISMOGRAPHS (WWNSS). HOWEVER, TO ACHIEVE A SIGNIFICANT IMPROVEMENT IN NETWORK SIGNAL DETECTION CAPABILITY WILL REQUIRE REDUCTION OF BACKGROUND NOISE BY RELOCATION OF SOME STATIONS TO REMOTE

AREAS, WITH DATA TELEMETERED BACK TO THE RECORDING STATION. NEW SITES WILL BE MUTUALLY SELECTED AS THE RESULT OF SITE SURVEYS. DATA WILL BE RECORDED ON DIGITAL MAGNETIC TAPE AND ALSO VISUAL TAPE ANALOG RECORDING FOR LOCAL ANALYSIS. MAGNETIC TAPES WILL BE MAILED TO THE U.S. FOR ANALYSIS WITH

SEISMIC DATA BEING GATHERED FROM SRO'S AND OTHER EXISTING SEISMIC STATIONS.

4. IMPLEMENTATION PLAN -- HMG WOULD OBTAIN PERMISSION FROM THE SWAZILAND GOVERNMENT TO CO-LOCATE THE JOINT U.S.-U.K. SRO STATION WITH THEIR EXISTING GEOPHYSICAL STATION ON A COMPLETELY UNCLASSIFIED BASIS. FOLLOWING APPROVAL OF THE PROJECT, HMG WOULD PROVIDE A NAME AND ADDRESS CONTACT AT THEIR STATION IN SWAZILAND THROUGH UNCLASSIFIED

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WHICH DETAILED ARRANGEMENTS FOR THE INSTALLATION WILL BE MADE BY NOAA.

5. FOR EMBASSY LONDON: EMBASSY IS REQUESTED TO OUTLINE PROPOSED PROGRAM TO HMG OFFICIALS AND CONFIRM OFFICIALLY OUR UNDERSTANDING OF U.K. WILLINGNESS TO PARTICIPATE IN THE SRO PROGRAM AS OUTLINED. WE SUGGEST THAT, INTER ALIA, DR. PANTON MIGHT BE AN APPROPRIATE POINT OF CONTACT.

6. FOR EMBASSY MBABANE: IT IS INTENDED THAT GOS BE FULLY INFORMED OF U.S. PARTICIPATION IN JOINT SRO. HOWEVER, SINCE SITE PREPARATION AND STATION OPERATION WILL BE BY U.K. PERSONNEL, WE DESIRE APPROACH TO GOS FOR AUTHORIZATION BE MADE BY HMG. NOAA PERSONNEL WILL VISIT SWAZILAND FOR PURPOSES OF SITE SELECTION AND EQUIPMENT INSTALLATION ONLY. NO CONTACT WITH GOS OFFICIALS IS PLANNED BY NOAA. RUSH

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